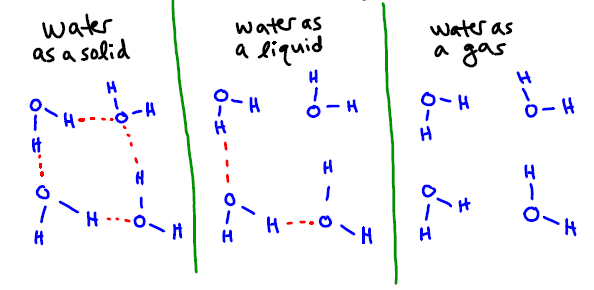
**Water’s High Heat of Vaporization – Explained**

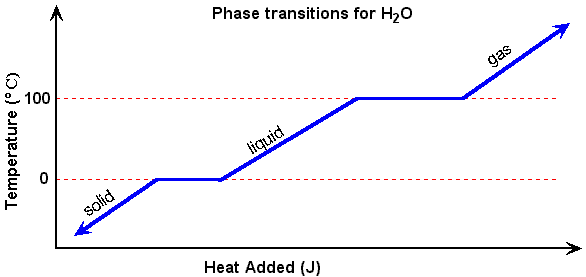
Mrs. Krouse, AP Biology, 2015-2016

*\*\*\*Note: This is an add-on to the Unit 4, Part 2 Notes – Properties of Water and will help you answer #1 in the Notes Questions\*\*\**

Water has a high heat of vaporization, which is defined as the energy required to change one gram of liquid water to a gas (water vapor).

The reason water has a high heat of vaporization has to do with the hydrogen bonds that form between nearby water molecules. There are more hydrogen bonds (shown as dotted lines in the image below) between water molecules in the solid state than there are in the liquid state. There are more hydrogen bonds between water molecules in the liquid state than there are in the gaseous state. To convert water from a liquid to a gas, hydrogen bonds between water molecules must be broken to spread the molecules apart and get them moving more quickly. Heat energy is used to break these hydrogen bonds. Because so many hydrogen bonds must be broken, water has a high heat of vaporization.



Because heat energy from the environment is used to break hydrogen bonds during phase changes, the actual temperature of the water does not change when water is converting from a solid to a liquid or a liquid to a gas. This is seen in the graph below.